

## Claims

1. An isolated nucleic acid encoding a protein comprising an amino acid sequence at least 25% identical to any one of the amino acid sequences of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280 over the entire length of said amino acid sequence of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280 wherein said protein is a pathogenic virulence factor.

2. The nucleic acid of claim 1, encoding a protein comprising an amino acid sequence at least 50% identical to any one of the amino acid sequences of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280 over the entire length of said amino acid sequence of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280.

3. The nucleic acid of claim 1, comprising a polynucleotide sequence at least 80% identical to any one of the polynucleotide sequences of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282 over the entire length of said polynucleotide sequence of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282.

4. The nucleic acid of claim 3, comprising a polynucleotide sequence identical to any one of the polynucleotide sequences of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282.

5. The nucleic acid of claim 1, wherein said protein binds a human protein.

6. The nucleic acid of claim 5, wherein said human protein is a lung protein.

7. The nucleic acid of claim 1, wherein said protein has an Arg-Gly-Asp motif.

8. An isolated nucleic acid comprising a polynucleotide sequence at least 65% identical to the corresponding region of any one of the polynucleotide sequences of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282 or the complement thereof.

9. An isolated nucleic acid that hybridizes at high stringency to a region of any one of the polynucleotide sequences of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282 or the complement thereof.

10. The nucleic acid of claim 9, having a sequence complementary to at least 50% of at least 60 nucleotides of any one of the polynucleotide sequences of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282.

11. The nucleic acid of claim 8, comprising at least 100 contiguous nucleotides of any one of the polynucleotide sequences of SEQ ID NOs: 1-108, SEQ ID NOs: 119-120, and SEQ ID NOs: 281-282.

12. The nucleic acid of claim 8, encoding a protein or protein fragment that binds a human lung protein.

13. The nucleic acid of claim 8, encoding a protein or protein fragment comprising an Arg-Gly-Asp motif.

14. A vector comprising a nucleic acid of claim 1.

15. A substantially pure protein comprising an amino acid sequence at least 25% identical to any one of the amino acid sequences of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280, wherein said protein is a pathogenic virulence factor.

16. The protein of claim 15, comprising an amino acid sequence at least 50% identical to any one of the amino acid sequences of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280.

17. The protein of claim 16, comprising an amino acid sequence identical to any one of the amino acid sequences of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280.

18. The protein of claim 15, comprising at least 100 contiguous amino acids of any one of the amino acid sequences of SEQ ID NOs: 127-229 and SEQ ID NOs: 278-280.

19. The protein of claim 18, wherein said protein is immunogenic.

20. The protein of claim 15, wherein said protein binds a human protein.

21. The protein of claim 20 wherein said human protein is a lung protein.

22. The protein of claim 15, comprising an Arg-Gly-Asp motif.

23. An isolated nucleic acid encoding a protein comprising an amino acid sequence at least 25% identical to any one of the amino acid sequences of SEQ ID NOs: 269-277 wherein said protein binds the polypeptide (SEQ ID NO: 278 or SEQ ID NO: 280) encoded by the nucleic acid sequence of ORF7 (SEQ ID NO: 119 or SEQ ID NO: 281).

24. The nucleic acid of claim 23, wherein said protein is expressed in the lungs of a mammal.

25. A substantially pure protein comprising an amino acid sequence at least 25% identical to any one of the amino acid sequences of SEQ ID NOs: 269-277, wherein said

protein binds the polypeptide (SEQ ID NO: 278 or SEQ ID NO: 280) encoded by the nucleic acid sequence of ORF7 (SEQ ID NO: 119 or SEQ ID NO: 281).

26. The protein of claim 25, wherein said protein is expressed in the lungs of a mammal.